

US EPA ARCHIVE DOCUMENT

D164127*
DPBARCODE (RECORD)
122804
SHAUGHNESSY NO

2/19/1992

REVIEW NO.

EEB REVIEW

DATE IN: 5-8-91 OUT: 2-19-92

ASSIGNED:

CASE # : 002518

REREG CASE #: _____

SUB. # : S395495

LIST A, B, C, D

ID # : 618-98

DATE OF SUBMISSION 5-7-91

DATE RECEIVED BY EFED 5-8-91

SRRD/RD REQUESTED COMPLETION DATE 6-7-91

EEB ESTIMATED COMPLETION DATE _____

SRRD/RD ACTION CODE/TYPE OF REVIEW 300

MRID #(S) _____

DP TYPE 001

PRODUCT MANAGER, NO. GEORGE LAROCCA 13

PRODUCT NAME(S) AVERMECTIN

TYPE PRODUCT _____

COMPANY NAME MERCK

SUBMISSION PURPOSE AMEND LABEL, CONSIDER PROPOSED USE ON

STRAWBERRIES, HEAD LETTUCE, ALMONDS

WALNUTS, PEARS, TOMATOES, CELERY

COMMON CHEMICAL NAME _____

REVIEWER: DAN RIEDER

ALSO COVERS OTHER ACTIONS INCLUDING:

RECORD NUMBER: 234652 TOMATOES

DPBARCODE: D163062 HEAD LETTUCE, WALNUTS, ALMONDS

RECORD NUMBER: 250282 PEARS

DPBARCODE: D155121 STRAWBERRIES



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

~~2-1555~~
D164127
D163062
D155121
234652
250282

OFFICE OF
PESTICIDES AND TOXIC
SUBSTANCES

MEMORANDUM

FEB 19 1992

SUBJECT: Adverse Effects from Use of Avermectin

FROM: Douglas Urban, Acting Chief
Ecological Effects Branch
Environmental Fate and Effects Division H7507C

Douglas Urban
2/18/92

TO: George LaRocca, PM
Insecticides/Rodenticide Branch
Registration Division H7505C

The Ecological Effects Branch has reviewed the proposed usage of Avermectin on various crops at uses up to 0.025 lb ai/acre. These uses include: strawberries, head lettuce, almonds, walnuts, pears, tomatoes, and celery. Based on that proposal, the following is concluded:

Impact to Birds is expected to be minimal.

Adverse effects to fish are expected to be minimal.

Chronic effects to mammals are expected where multiple applications per season occur *within 21 days of each other.*

Aquatic invertebrates are expected to be affected by runoff (all crops) and drift (pear and nut trees only).

Field testing for both mammals and aquatic invertebrates is required to negate the presumption of risk for each use. It is unlikely that one terrestrial field study will suffice for all crops. Although some crops may be similar enough so that one will suffice more some others. A correctly conducted mesocosm may address aquatic effects for all the proposed uses.

Pertinent acute toxicity data

Bobwhite quail
Mallard duck

LD50>2000 mg/kg
LD50= 85 mg/kg

Bobwhite quail
Mallard duck

LC50=3102 ppm
LC50= 383 ppm

Mouse
Rat

LD50= 13-23 mg/kg
LD50= 10-11 mg/kg

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Daphnia magna
Mysid shrimp

LC50 0.22-0.34 ppb
LC50= 0.02 - 0.033 ppb

Bluegill
Rainbow trout

LC50=9.6 ppb
LC50=3.2 ppb

Pertinent chronic toxicity data

Rat 1-generation reproduction
77-712-0

NOEL=0.1 mg/kg/day (1 ppm¹)
LEL=0.2 mg/kg/day (2 ppm¹)

Mouse 10-day oral NOEL
mortality to adult mice at --
Mouse Terat. with
photodegradata 84-722-1

NOEL=0.05 mg/kg/day (0.5 ppm¹)
LEL=0.075 mg/kg/day (0.75 ppm¹)
NOEL=0.05 mg/kg/day (0.5 ppm¹)
LEL=0.1 mg/kg/day (1 ppm¹)

Avian reproduction test

NOEL=12 ppm
LEL=64 ppm (reduced egg prod.)

Daphnia magna life-cycle

MATC >0.03<0.09 ppb (all dead by
day 5 at 0.09 ppb)

Rainbow trout early life stage

MATC >0.52<0.96 ppb

Mysid Shrimp Life-cycle

MATC >0.0035<0.0093 ppb

TERRESTRIAL RISK ASSESSMENT

The following theoretical residue values (ppm) were calculated from a nomograph developed from historical measured residue data presented in Hoerger and Kenaga (1972)¹.

<u>Use Rate</u>	<u>Short</u>	<u>Long</u>	<u>Leafy</u>	<u>Insects</u>	<u>Seed</u>	
0.02 lb/A	<u>Grass</u>	<u>Grass</u>	<u>Crops</u>	<u>Forage</u>	<u>Pods</u>	<u>Fruit</u>
Maximum ²	4.8	2.2	2.5	1.2	0.2	0.1
Typical ³	2.5	1.8	0.7	0.6	<0.1	<0.1

¹ Hoerger, F.C. and E.E. Kenaga. 1972. Pesticide Residues on Plants Correlation of Representative Data as a Basis for Estimation of Their Magnitude in the Environment. Environmental Quality. Academic Press, New York, I:9-28.

² The maximum residues that may occur on the particular food item immediately after application.

³ The typical residues that may occur on each listed material immediately after application.

<u>Use Rate</u>	<u>Short</u>	<u>Long</u>	<u>Leafy</u>	<u>Insects</u>	<u>Seed</u>	
0.025 lb/A	<u>Grass</u>	<u>Grass</u>	<u>Crops</u>	<u>Forage</u>	<u>Pods</u>	<u>Fruit</u>
Maximum	6	2.7	3.1	1.5	0.3	0.2
Typical	3.1	2.3	0.9	0.8	0.07	0.04

Acute and chronic effects to birds are not expected since estimated residues do not exceed the dietary LC50 of 383 ppm or the avian reproduction NOEL of 12 ppm.

These residues do not exceed acute dietary concern levels for mammals (100 ppm⁴). These levels do exceed the level which caused mortality (1 mouse in 20 at day 4) in a 10-day feeding study (0.75 ppm) and chronic effect levels such as the rat 1-generation NOEL (1 ppm), and the mouse teratogenic LEL's (2-4 ppm). Multiple applications (>3 per season at intervals less than 21 days), represent chronic exposure. Adverse acute effects are unlikely, however, chronic effects may occur to mammals exposed to residues such as those derived from the nomograph.

AQUATIC RISK ASSESSMENT

Runoff modeling was used to estimate the concentration in water from the use of avermectin at 0.02 lb ai/acre when applied to cotton. This will be used to represent runoff from a variety of vegetable crops. The following table reflects concentrations after one application. This was generated assuming a typical runoff year.

<u>Time (days)</u> <u>after loading</u>	<u>Water column</u> <u>pptr</u>	<u>Benthic</u> <u>pptr</u>
0	6.9	-
1	5.5	12.9
4	3.4	42.3
21	0.9	84.2
30	0.5	79.1
120	0.1	22.1
360	0	0.6

Concentrations would be slightly higher from a maximum use rate of 0.025 lb ai/acre.

The concentrations from runoff would exceed the shrimp NOEL of 3.5 pptr. The water column levels do not exceed the Daphnia magna chronic NOEL of 30 pptr. The concentrations in sediment do exceed both invertebrate chronic NOEL's and the shrimp LC50 of 20 pptr.

⁴ Based on the LD50 of 10 mg/kg from which a 1-day LC50 can be calculated (ppm=LD50 X WT / CONS) assuming a mammal consumes 10 % of its body weight per day.

Therefore, while only the more sensitive organisms would be affected by water column concentrations, concentrations in the sediment may have an adverse effect on a wide range of organisms. This concern must be addressed via field testing.

Average year levels do not exceed the rainbow trout early life stage NOEL of 520 pptr, nor 1/10 of that value (52 pptr). Adverse effects to fish are unlikely.

Exposure from drift is expected for pears and nut trees (air blast application results in drift). Assuming 5% of the applied is deposited on an adjacent waterbody 6 feet deep, the concentration would be 76 pptr. This exceeds aquatic invertebrate acute and chronic concern levels.

SUMMARY

During a typical year, the use of avermectin may result in adverse chronic effects to mammals and aquatic invertebrates occurring within and immediately adjacent to the treated areas. Drift from air blast treatment may cause acute and chronic effects to aquatic invertebrates.

The proposed uses require field testing **which negates the presumption of risk** before EEB can conclude minimal adverse effects to mammals and aquatic invertebrates.

ENDANGERED SPECIES CONSIDERATIONS

The following table indicates the endangered species concern levels based on laboratory data.

Triggers:

Avian	Acute	38 ppm (1/10 LC50)
	Chronic	12 ppm (Rep. NOEL)
Mammal	Acute	10 ppm (1/10 LC50 ⁵)
(reptiles and amphibians)	Chronic	0.5 ppm (NOEL ⁶)
Fish	Acute	0.16 ppb (1/20 LC50)
	Chronic	0.52 ppb (ELS NOEL)
Mollusks	Acute	21.5 ppb (1/20 EC50)
Terrestrial Invertebrates:	Assumed hazardous to any exposed	

The use of avermectin at 0.025 lb. ai/acre is not expected to affect endangered birds or fish.

⁵ The LD50 of 10 mg/kg is used to develop a 1-day dietary LC50 of approximately 100 ppm assuming 10% food consumption.

⁶ Dietary NOEL extrapolated from 10-day oral pregnant mouse test assuming a mammal consumes 10% of its body weight per day.

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Consultation with USFWS required

The proposed uses of avermectin may affect endangered and threatened aquatic and terrestrial invertebrates and mammals. Formal consultation with the USFWS may be initiated when the field testing has been submitted.

If you have questions concerning this review, please contact Dan Rieder.

Note added by Dan Rieder 2-20-92

In a 2-19-92 mtg w/ Merck I learned that the proposed use on almonds, walnuts and pears had been changed. They indicated the between treatment interval was lengthened to 21 days or greater. Based on this I concluded that chronic effects to mammals were unlikely because avermectin would degrade to levels below those expected to be hazardous to mammals. Terrestrial field testing for effects to mammals is not required for pears, walnuts and almonds. Aquatic field testing is required for these uses.

Mammal and aquatic field testing is required for strawberries, lettuce, tomatoes and celery based on current exposure estimates.



2-20-92